



UNITED STATES DEPARTMENT OF COMMERCE  
Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231

SERIAL NUMBER FILING DATE FIRST NAMED INVENTOR ATTORNEY DOCKET NO.

08/809,463 07/18/97 NAKAMURA

M

P97.0322

MM21/0819

EXAMINER

HILL STEADMAN & SIMPSON  
85TH FLOOR SEARS TOWER  
CHICAGO IL 60606

ATTORNEY'S PAPER NUMBER

2814

DATE MAILED: 08/19/98

This is a communication from the examiner in charge of your application.  
COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☒ Responsive to communication filed on 6/9/98 ☒ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s) 0 days from the date of this letter.  
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☐ Notice of References Cited by Examiner, PTO-892.
2. ☐ Notice of Draftsman's Patent Drawing Review, PTO-948.
3. ☐ Notice of Art Cited by Applicant, PTO-1449.
4. ☐ Notice of Informal Patent Application, PTO-152.
5. ☐ Information on How to Effect Drawing Changes, PTO-1474.
6. ☐

Part II SUMMARY OF ACTION

1. ☒ Claims 1-19 are pending in the application.

Of the above, claims are withdrawn from consideration.

2. ☐ Claims have been cancelled.

3. ☐ Claims are allowed.

4. ☒ Claims 1-19 are rejected.

5. ☐ Claims are objected to.

6. ☐ Claims are subject to restriction or election requirement.

7. ☐ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.

8. ☐ Formal drawings are required in response to this Office action.

9. ☐ The corrected or substitute drawings have been received on Under 37 C.F.R. 1.84 these drawings are ☐ acceptable; ☐ not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).

10. ☐ The proposed additional or substitute sheet(s) of drawings, filed on has (have) been ☐ approved by the examiner; ☐ disapproved by the examiner (see explanation).

11. ☐ The proposed drawing correction, filed has been ☐ approved; ☐ disapproved (see explanation).

12. ☐ Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received; ☐ not been received.  
☐ been filed in parent application, serial no. ; filed on

13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.

14. ☐ Other

EXAMINER'S ACTION

11/8 8/809,463

RECEIVED  
AUG 19 1998  
HILL STEADMAN & SIMPSON

Art Unit: 2814

Claims 1-19 are pending in this application.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 3, 4, 7, 9, 10, 11, 12, 13, 14, 17, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson et al. (U.S. #5,098,859) in view of Nirschl et al. (DE 41 29 647 A1).

The grounds of rejection as discussed in the Office Action mailed 3/5/98 (paper no. 7) are maintained.

Claims 5, 6, 8, 15, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson and Nirschl and further in view of Ishihara (kokai 59-66166).

The grounds of rejection as discussed in the Office Action mailed 3/5/98 (paper no. 7) are maintained.

### **Response to Remarks**

Applicant has overcome the 112(2) rejection through amendment.

Art Unit: 2814

Applicant's remarks drawn to the prior art rejections have been considered, but are not found to be persuasive.

Applicant argues that there is no motivation to combine the references and there is no indication that such a combination would result in the Applicant's claimed invention. The examiner disagrees. Applicant's claim 1, for example requires three elements: (1) a III-V compound semiconductor body, (2) a non-single crystal semiconductor layer comprising In, and (3) a film including at least a metal nitride film. Turning to the cited prior art, Jackson discloses an improved contact to a III-V compound semiconductor body (GaAs). This improvement includes a non-single crystal semiconductor layer comprising In formed atop the III-V compound semiconductor body. Jackson completes this structure by forming a layer of metal atop the non-single crystal semiconductor layer comprising In. With respect to the metal layer, Jackson observes that "the metal is not critical and any metal will make a good contact." (col. 6, lines 7-10) Thus, Jackson's structure differs with respect to claim 1 only with respect to the upper metal layer, which Jackson teaches may be any metal at all. Moving on to the secondary reference, Nirschl teaches an improvement to a metal contact to a III-V semiconductor layer. This improvement includes a first metal layer (2) formed atop a III-V body, followed by a metal nitride layer (5) followed by an adhesion promoting layer (6) followed by a final metal layer (4). The examiner maintains that one skilled in the art when taking these two teachings collectively would have been motivated to form Jackson's upper metal layer in the manner taught by Nirschl because

Art Unit: 2814

Nirschl's upper metal layer is disclosed as an improved metal contact to a III-V body, the very function of Jackson's upper metal layer.

Finally, with respect to the Ishihara reference, the examiner has relied on the reference only for teaching the use of Ti as an adhesion layer in a multi-layer contact structure. Applicant argues that there is no motivation to combine the teachings of Ishihara with the other references used. The examiner maintains that Nirschl's description of a layer solely in terms of its adhesive property together with Ishihara's successful use of titanium as an adhesive layer in a multi-layer structure provides sufficient motivation to one skilled in the art to use titanium and the adhesive layer in the collectively taught structure.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Serial Number: 08/809,463

Page 5


Art Unit: 2814

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan Kelley whose telephone number is (703) 305-3789. The fax phone number for this Group is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

N. Kelley

August 17, 1998

  
Olik Chaudhuri  
Supervisory Patent Examiner  
Technology Center 2800